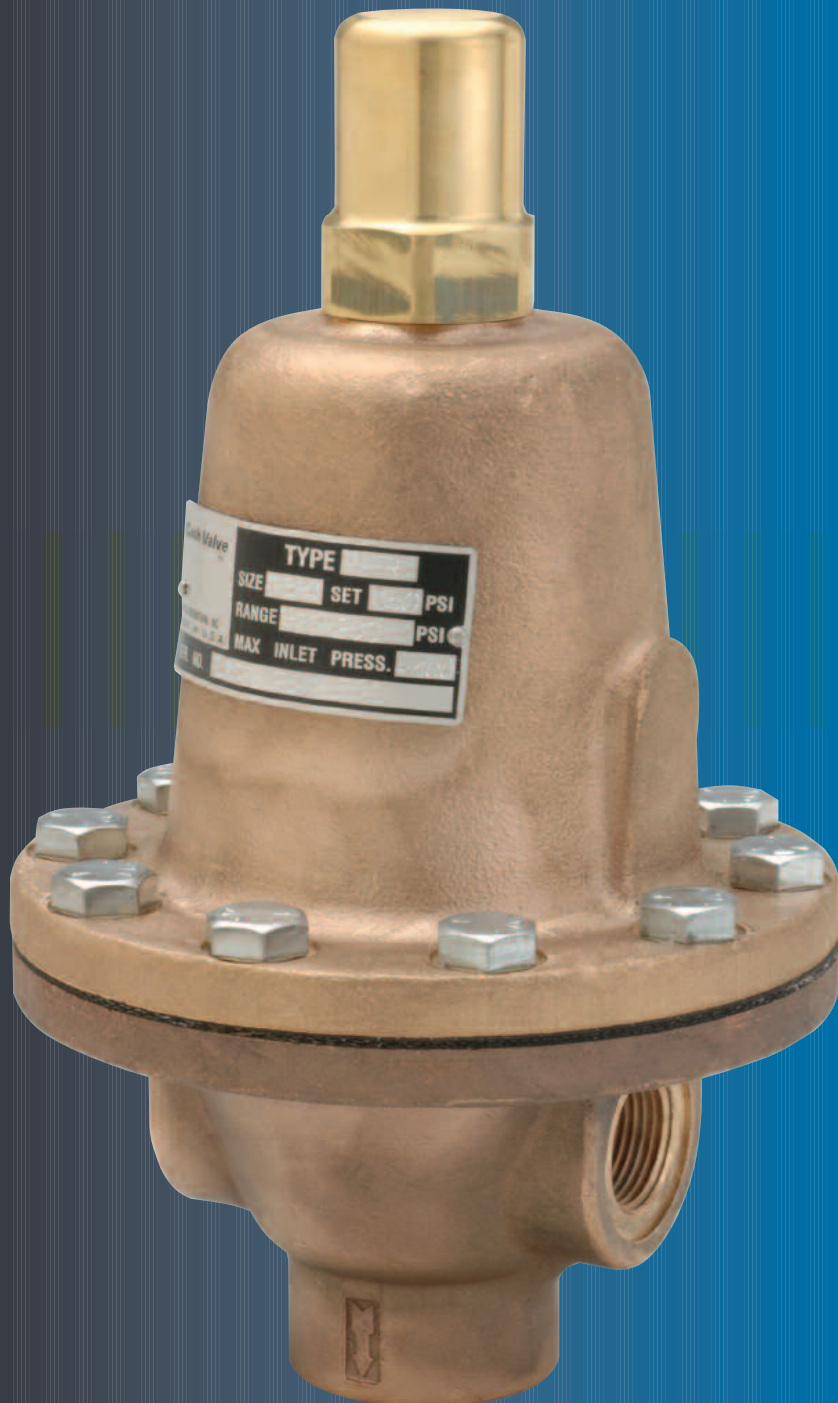


# Cash Valve



## FR Series

### Back Pressure Valves

Issued - August 2000  
CAVMC-0516-US-0609  
ISO 9001 Certified

## FR Series - General Information/Back Pressure Valves

### Description

Cash Valve FR Series back pressure valves are diaphragm actuated and are designed for either continuous or intermittent operation, limiting the desired maximum pressure in a system by relieving into a lower pressure line or area. When properly sized, these valves will both open and close at

predetermined points to provide accurate functional control for the continuous protection of pumps, process piping systems and similar equipment. FR Series valves are not emergency safety devices but are continuously operating pieces of equipment. The unique full floating

seating arrangement incorporated in both the full size FR, FR-6, and FR-10 models and the miniature version FRM, FRM-2, and FRM-C models provides for smooth even control in response to pressure changes.

### Operation

In a typical installation, inlet pressure enters from the side of the valve and registers under the diaphragm. When pressure rises above the set point of the valve, the diaphragm moves upward —

away from the seat — allowing flow to pass through the bottom port. When inlet pressure drops below the setting of the valve, the diaphragm moves downward to the closed position. Cash

Valve's FR Series back pressure valves feature a "floating ring," which provides good closure and practically frictionless performance.

## FR, FR-6, FR-10 Diaphragm Type Back Pressure Valves

### Description

Cash Valve's Type FR, FR-6, and FR-10 are fully automatic back pressure valves designed to dependably maintain a pre-determined pressure on the inlet regardless of variations in pressure at the outlet. Excess pressure is relieved into a lower pressure line. Performance is virtually unaffected by pressure variations in the return line. FR Series valves are not emergency devices, but are continuously operating valves which provide accurate, repetitive, pressure control.

FR Series valves are intended for use on practically all fluids and gases except steam. They are especially well suited for all grades of oils, including Bunker "C", and may be used in centrifugal, regenerative turbine, reciprocating or rotary pump bypass valve applications.

FR Series valves are available in various pressure control and temperature ranges and are designated as follows:

- Type FR-10: 0-250 psi; 450°F\*
- Type FR: 0-400 psi; 200-600°F\*
- Type FR-6: 200-600 psi; 200-600°F\*

\* Maximum temperature limits depend upon valve construction. Refer to the Selection Information chart on page 5 for additional information.

The Type FR-10 is for more economical, lower pressure applications and is fitted with an iron body and spring chamber.

All FR Series valves incorporate a "floating ring" seating arrangement (see Features) which provides tight closure and practically frictionless performance.

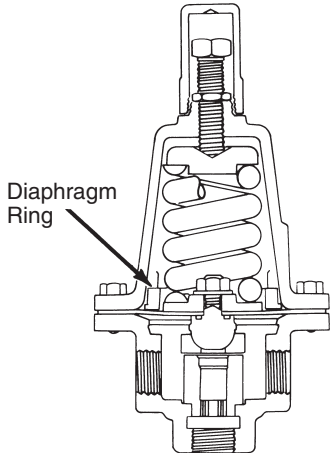
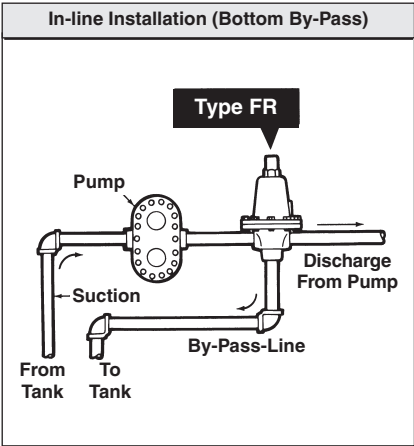
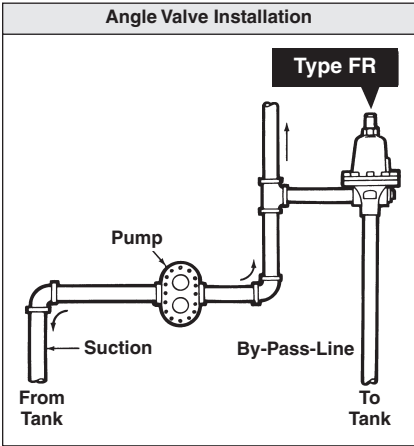


## Features

- Sizes: 1/2", 3/4", 1", 1 1/4", 1 1/2", and 2"
- FR Series valves protect against periodic high pressure, control dependably at adjusted pressures, and shut tight. These valves afford unusually close regulation, repeatability of opening pressure and close reseating pressures.
- Angle valve or in-line valve installation: Series FR valves have a globe type body and are fitted with two side inlets

and a bottom outlet. Installation may be made either as an angle valve, with one inlet plugged, or in line with the pump. All Series FR valves discharge at the bottom of the valve.

- Closing Cap: Types FR and FR-6 are fitted with a closing cap over the top adjusting screw to discourage unauthorized tampering with the set pressure.

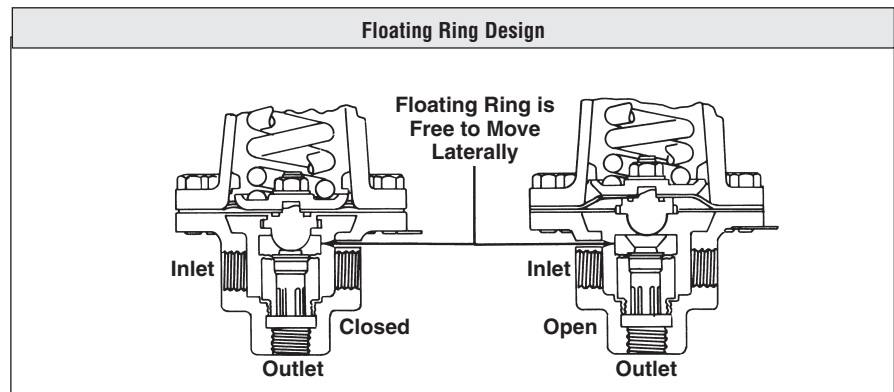


**Type FR-6  
Interior View**

# FR Series - Back Pressure Valves

## Features (Continued)

- Unique “Floating Ring” design: A special feature of FR Series Back Pressure Valves, not found in the ordinary valve, is Cash Valve’s unique “floating ring” seating arrangement. The “floating ring” principle completely compensates for unavoidable misalignment, producing perfect seat contact, free to move laterally in any direction to find its own correct alignment with the spherical seat disc. Thoroughly tested and proven to give far superior performance than ordinary valves using pistons and cylinders where good seat alignment is next to impossible. The diaphragm and seat disc are fastened securely together resulting in positive and rapid seat movement in response to all pressure changes.
- Optional Differential Pressure Control: With slight factory modification, Type FR Series valves may be used as a differential pressure regulator; to hold constant a pressure difference between the reference pressure and



the valve inlet pressure. Contact the factory for details.

- Type FR-6 incorporates a diaphragm ring mounted above the diaphragm to accommodate higher back pressure ranges. Refer to the FR-6 interior view shown on the page 2.
- Simplicity of design: The rugged but simple design incorporated in each FR Series back pressure valve lends itself to easy maintenance and repair.

Disassembly is a simple matter when replacing diaphragms, pressure springs or ball seat and ring. All major repairs can be made without removing the valve from the line.

- Optional Cryogenic Service: Approved construction is offered in the FR Series for handling cold fluids to -320°F. Write for Data Sheet CAVMC-0514 for more details.

## Construction/Specifications

Cash Valve Series FR back pressure valves incorporate an iron or bronze body (iron standard on Type FR-10; carbon steel or stainless steel may be

fitted to Types FR and FR-6 on special order) with threaded connections\*, bronze, Monel®, stainless steel or BUNA-N diaphragm; brass or stainless

steel body seat, with a renewable stainless seat disc and seat ring.

| Spring Adjustment Ranges (in psi) |         |       |        |        |         |         |           |            |       |        |        |         |
|-----------------------------------|---------|-------|--------|--------|---------|---------|-----------|------------|-------|--------|--------|---------|
| Valve Size                        | Type FR |       |        |        |         |         | Type FR-6 | Type FR-10 |       |        |        |         |
| 1/2"                              | 0-25    | 5-50  | 30-100 | 75-175 | 150-400 |         | 200-600   | 0-25       | 5-50  | 30-100 | 75-175 | 100-250 |
| 3/4"                              | 0-10    | 10-50 | 20-110 | 30-200 | 100-250 | 150-400 | 200-600   | 0-10       | 10-50 | 20-110 | 30-150 | 100-250 |
| 1"                                | 0-20    | 20-90 | 40-125 | 50-230 | 175-380 | 300-400 | 200-600   | 0-20       | 20-90 | 40-125 | 50-250 |         |
| 1 1/4"                            | 0-15    | 20-85 | 40-125 | 50-230 | 175-380 | 300-400 | 200-600   | 0-20       | 20-90 | 40-125 | 50-250 |         |
| 1 1/2", 2"                        | 0-10    | 10-55 | 30-100 | 40-200 | 125-300 | 200-400 | 200-600   | 0-10       | 10-55 | 30-100 | 40-200 | 125-250 |

**IMPORTANT: All FR, FR-6 and FR-10 versions are furnished with a travel stop that prevents diaphragms from extending beyond their limit.**

\* 1/2" FR only UL approved in iron body and metal diaphragm up to 150 psi.

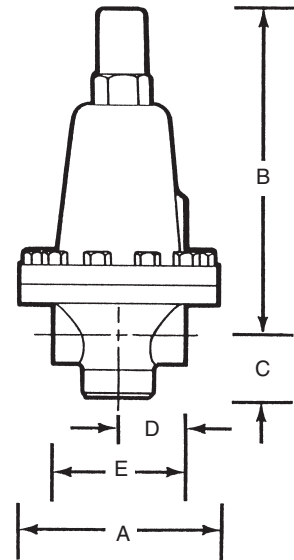
Construction/Specifications (Continued)

| Type     | Valve Size | Dimensions |          |        |          |        | Shipping Weight (lbs.) |        |
|----------|------------|------------|----------|--------|----------|--------|------------------------|--------|
|          |            | A          | B        | C      | D        | E      | Iron                   | Bronze |
| FR, FR-6 | 1/2"       | 4 3/4"     | 6 3/4"   | 1 5/8" | 1 7/16"  | 2 7/8" | 8                      | 9 1/2  |
|          | 3/4"       | 5 5/8"     | 8"       | 2"     | 1 11/16" | 2 3/8" | 13                     | 14 3/4 |
|          | 1"         | 6 1/2"     | 10 5/16" | 2 1/4" | 2 1/8"   | 4 1/4" | 20 1/4                 | 23 1/2 |
|          | 1 1/4"     | 6 1/2"     | 10 7/16" | 2 3/8" | 2 1/8"   | 4 1/4" | 21 1/2                 | 24 1/2 |
|          | 1 1/2"     | 7 1/2"     | 10 3/4"  | 2 5/8" | 2 1/2"   | 5"     | 29                     | 33     |
|          | 2"         | 7 1/2"     | 11"      | 3"     | 2 1/2"   | 5"     | 31 1/2                 | 35 1/2 |

Maximum Operation Temperature: 600°F

| Type  | Valve Size | Dimensions |         |        |          |        | Shipping Weight (lbs.) |
|-------|------------|------------|---------|--------|----------|--------|------------------------|
|       |            | A          | B       | C      | D        | E      |                        |
| FR-10 | 1/2"       | 4 3/4"     | 6 9/16" | 1 5/8" | 1 7/16"  | 2 7/8" | 7                      |
|       | 3/4"       | 5 5/8"     | 7 1/2"  | 2"     | 1 11/16" | 3 3/8" | 11 1/2                 |
|       | 1"         | 6 1/2"     | 8 1/2"  | 2 1/4" | 2 1/8"   | 4 1/4" | 18 1/4                 |
|       | 1 1/4"     | 6 1/2"     | 8 5/8"  | 2 3/8" | 2 1/8"   | 4 1/4" | 19 1/2                 |
|       | 1 1/2"     | 7 1/2"     | 10"     | 2 5/8" | 2 1/2"   | 5"     | 27                     |
|       | 2"         | 7 1/2"     | 10 1/4" | 3"     | 2 1/2"   | 5"     | 29 1/2                 |

Maximum Operation Temperature: 450°F



Type FR

FRM, FRM-2, FRM-C Diaphragm Type Miniature Back Pressure Valves

Application

Cash Valve's Types FRM, FRM-2, and FRM-C function as automatic pressure limiting regulators, maintaining a desired maximum pressure in a system or vessel by relieving excess pressure. The FRM Series valves are small and compact, yet are highly efficient, making them suitable for numerous applications that call for a small accurate back pressure regulator.

FRM Series back pressure valves are intended for service on liquids, air and gases that are not corrosive to bronze.

Type FRM-C is a soft-seated version of Type FRM. The Type FRM-2 is designed with larger physical dimensions and internal seat opening providing greater capacity. Type FRM-2 is also suitable for fuel oils and lube oils.

| Type        | Valve Size | Relief Press. Range (psi) | Valve Connections |           |            |
|-------------|------------|---------------------------|-------------------|-----------|------------|
|             |            |                           | S.I.-S.O.         | S.I.-B.O. | 2S.I.-B.O. |
| FRM & FRM-C | 1/8"       | 0-175                     | X                 | X         | FRM Only   |
|             | 1/4"       | 0-175                     | X                 | X         | X          |
|             | 3/8"       | 0-175                     | X                 | X         |            |
| FRM-2*      | 1/4"       | 0-250                     | X                 | X         | X          |
|             | 3/8"       | 0-250                     | X                 | X         | X          |
|             | 1/2"       | 0-250                     | X                 | X         | X          |

NOTE: Abbreviations used above are to be read as follows: S.I. = Side Inlet; 2S.I. = Two Side Inlets; S.O. = Side Outlet; B.O. = Bottom Outlet

\* The Type FRM-2 is UL Approved in all sizes and body styles with metal diaphragms up to 150 psi.



Type FRM

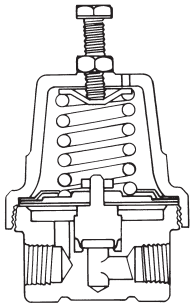


Type FRM-2

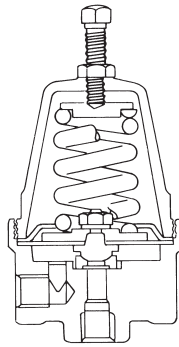
# FR Series - Back Pressure Valves

## Features

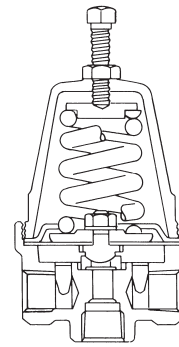
- Small and compact; available in 1/8", 1/4", 3/8" and 1/2" sizes.
- Types FRM and FRM-2 incorporate the same superior "floating ring" design as used in the larger Type FR to provide smooth, even pressure control. See page 5 for full description.
- Furnished with either neoprene diaphragm or metal diaphragms in three body styles. (Type FRM-C fitted with metal diaphragms only.)
- Maximum Temperature:
  - with neoprene diaphragm : 180°F.
  - with metal diaphragm : 500°F.
- Type FRM-2 is available in stainless steel body and system exposed internal parts for service with corrosive or harsh fluids. For additional information consult the factory.
- Optional Cryogenic Service: Approved construction is offered for the FRM and FRM-2 to enable it to be used for oxygen service suitable for temperatures to -320°F. For details write for Data Sheet CAVMC-0514.
- All versions fitted with adjusting screw standard. Also available with T-handle and, on special order, with bushing for mounting the valve to a control panel.
- All FRM, FRM-2, and FRM-C versions are furnished with a travel stop that prevents diaphragms from extending beyond their limit.



**Type FRM-C**  
Side Inlet - Side Outlet



**Type FRM-2**  
Side Inlet - Bottom Outlet



**Type FRM-2**  
Two Side Inlet - Bottom Outlet

## Construction/Specifications

FRM Series back pressure valves are fitted with forged bronze bodies, bronze or aluminum (Type FRM only) spring

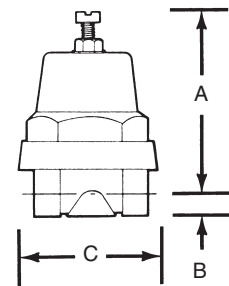
chambers and neoprene or phosphor bronze diaphragms (metal diaphragms only in FRM-C).

| Type FRM, FRM-C Spring Adjustment Ranges (in psi) |      |      |       |       |        |        |
|---|------|------|-------|-------|--------|--------|
| 0-2   | 2-15 | 2-30 | 10-50 | 40-90 | 40-125 | 75-175 |

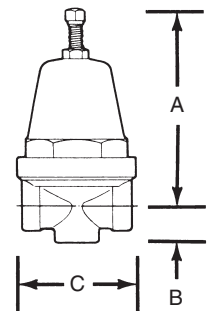
| Type FRM-2 Spring Adjustment Ranges (in psi) |       |       |        |         |         |
|--|-------|-------|--------|---------|---------|
| 0-30   | 20-50 | 40-80 | 75-150 | 100-250 | 200-400 |

**NOTE:** The type FRM-2 is UL approved in all sizes and body styles with metal diaphragms up to 150 psig.

| Type        | Valve Size | Dimensions |       |         | Ship. Wt. (lbs.) |
|-------------|------------|------------|-------|---------|------------------|
|             |            | a          | b     | c       |                  |
| FRM & FRM-C | 1/8"x1/8"  | 33/8"      | 1/2"  | 21/4"   | 11/8             |
| FRM & FRM-C | 1/4"x1/4"  | 33/8"      | 1/2"  | 21/4"   | 11/8             |
| FRM & FRM-C | 3/8"x3/8"  | 33/8"      | 1/2"  | 21/4"   | 11/8             |
| FRM-2       | 1/4"x1/4"  | 41/2"      | 3/4"  | 211/16" | 21/2             |
| FRM-2       | 3/8"x3/8"  | 41/2"      | 3/4"  | 211/16" | 21/2             |
| FRM-2       | 1/2"x1/2"  | 41/2"      | 11/8" | 27/8"   | 31/2             |



**Type FRM**



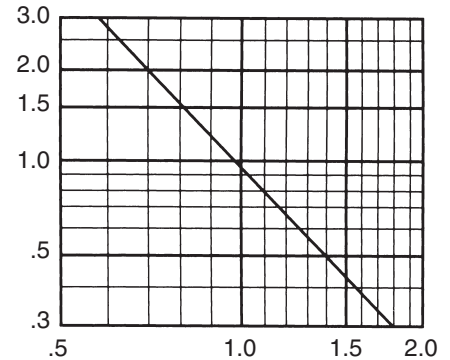
**Type FRM-2**

**Capacity Information**

Capacity charts (water and air) for Types FRM, FRM-2 and FRM-C are shown on page 9.

**NOTE:** The capacity charts for water are based on the specific gravity reading of water. If a liquid other than water is being used in the system, it is necessary to correct for liquids having a specific gravity reading other than that of water. For example, assume that a fluid to be used has a specific gravity reading

of 1.5 and the given flow is 40 gpm. Refer to the specific gravity chart and find 1.5 on the vertical axis then read across to the diagonal intersect to obtain a S.G. factor of .8. Divide the given flow (40 gpm) by the .8 factor and obtain 50 gpm, the corrected flow for the fluid being used. Refer to the capacity charts to determine the correct valve size that should be used at the desired set pressure and at the corrected flow.



| Type FR, FR-6, FR-10 Water Capacity (gpm) |      |       |                       |                  |          |          |                 |          |          |                  |          |          |                 |          |          |                  |          |          |                 |          |      |
|---|------|-------|-----------------------|------------------|----------|----------|-----------------|----------|----------|------------------|----------|----------|-----------------|----------|----------|------------------|----------|----------|-----------------|----------|------|
| Types                                     |      |       | Set Pressure (psig) † | Inlet Sizes      |          |          |                 |          |          |                  |          |          |                 |          |          |                  |          |          |                 |          |      |
|   |      |       |                       | 1/2"             |          |          |                 |          |          | 3/4"             |          |          |                 |          |          | 1"               |          |          |                 |          |      |
|   |      |       |                       | Rubber Diaphragm |          |          | Metal Diaphragm |          |          | Rubber Diaphragm |          |          | Metal Diaphragm |          |          | Rubber Diaphragm |          |          | Metal Diaphragm |          |      |
| FR  | FR-6 | FR-10 | 10% Rise              | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise | 10% Rise | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise | 10% Rise | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise |      |
| X   |      | X     | 10*                   | 2.0              | 4.0      | 6.0      | 1.0             | 1.5      | 3.0      | 3.0              | 6.0      | 8.0      | 1.8             | 3.5      | 5.5      | 4.0              | 8.0      | 14.0     | 2.5             | 5.5      | 7.8  |
| X   |      | X     | 15                    | 2.2              | 4.2      | 6.5      | 1.2             | 2.0      | 3.5      | 3.2              | 6.2      | 8.5      | 2.0             | 4.5      | 6.5      | 5.0              | 10.0     | 17.0     | 3.0             | 6.5      | 9.5  |
| X   |      | X     | 20                    | 2.5              | 4.5      | 7.5      | 1.4             | 2.5      | 4.0      | 3.5              | 6.7      | 10.0     | 2.5             | 5.0      | 7.5      | 6.0              | 12.0     | 20.0     | 3.5             | 7.5      | 11.0 |
| X   |      | X     | 30                    | 3.0              | 5.0      | 9.0      | 1.7             | 3.0      | 5.0      | 4.0              | 7.2      | 11.5     | 3.0             | 6.0      | 9.5      | 7.5              | 14.0     | 23.0     | 4.0             | 9.0      | 13.0 |
| X   |      | X     | 40                    | 3.5              | 6.0      | 9.7      | 2.0             | 3.5      | 6.0      | 4.5              | 8.5      | 12.5     | 3.5             | 7.0      | 11.0     | 9.0              | 16.0     | 26.0     | 5.0             | 10.5     | 15.0 |
| X   |      | X     | 50                    | 3.7              | 6.5      | 10.5     | 2.2             | 4.0      | 7.0      | 4.7              | 9.5      | 14.5     | 4.0             | 8.0      | 12.0     | 10.0             | 18.0     | 30.0     | 5.5             | 12.0     | 17.0 |
| X   |      | X     | 75                    | 4.5              | 7.5      | 13.0     | 2.6             | 5.0      | 8.0      | 5.5              | 11.5     | 17.0     | 5.0             | 10.0     | 14.0     | 12.0             | 20.0     | 38.0     | 6.5             | 14.5     | 20.0 |
| X   |      | X     | 100                   | 5.0              | 9.5      | 16.0     | 3.0             | 6.0      | 10.0     | 6.0              | 14.0     | 21.0     | 6.0             | 11.0     | 16.0     | 14.5             | 27.0     | 46.0     | 7.5             | 17.0     | 24.0 |
| X   |      | X     | 150                   | 7.0              | 11.5     | 19.0     | 3.5             | 8.0      | 13.0     | 9.0              | 18.0     | 25.0     | 7.0             | 15.0     | 20.0     | 17.0             | 33.0     | 54.0     | 9.0             | 21.0     | 30.0 |
| X   | X    | X     | 200                   | 8.0              | 15.0     | 22.0     | 4.5             | 10.0     | 17.0     | 11.0             | 21.5     | 30.0     | 9.0             | 17.0     | 24.0     | 22.5             | 41.0     | 54.0     | 11.0            | 24.0     | 33.0 |
| X   | X    |       | 300                   | 12.0             | 19.0     | 25.0     | 7.5             | 15.0     | 22.0     | 16.0             | 26.5     | 30.0     | 13.0            | 20.0     | 28.0     | 27.0             | 54.0     | 54.0     | 15.0            | 29.0     | 42.0 |
| X   | X    |       | 400                   | 18.0             | 24.0     | 25.0     | 12.0            | 23.0     | 25.0     | 23.0             | 30.0     | 30.0     | 17.0            | 28.0     | 30.0     | 34.0             | 54.0     | 54.0     | 20.0            | 34.0     | 54.0 |
|   | X    |       | 600                   | 21.0             | 25.0     | 25.0     | 16.0            | 25.0     | 25.0     | 30.0             | 30.0     | 30.0     | 20.0            | 30.0     | 30.0     | 54.0             | 54.0     | 54.0     | 24.0            | 50.0     | 54.0 |

| Type FR, FR-6, FR-10 Water Capacity (gpm) |      |       |                       |                  |          |          |                 |          |          |                  |          |          |                 |          |          |                  |          |          |                 |          |       |
|---|------|-------|-----------------------|------------------|----------|----------|-----------------|----------|----------|------------------|----------|----------|-----------------|----------|----------|------------------|----------|----------|-----------------|----------|-------|
| types                                     |      |       | Set Pressure (psig) † | Inlet Sizes      |          |          |                 |          |          |                  |          |          |                 |          |          |                  |          |          |                 |          |       |
|   |      |       |                       | 1 1/4"           |          |          |                 |          |          | 1 1/2"           |          |          |                 |          |          | 2"               |          |          |                 |          |       |
|   |      |       |                       | Rubber Diaphragm |          |          | Metal Diaphragm |          |          | Rubber Diaphragm |          |          | Metal Diaphragm |          |          | Rubber Diaphragm |          |          | Metal Diaphragm |          |       |
| FR  | FR-6 | FR-10 | 10% Rise              | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise | 10% Rise | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise | 10% Rise | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise |       |
| X   |      | X     | 10*                   | 5.0              | 11.5     | 18.0     | 3.0             | 6.5      | 9.5      | 6.0              | 13.0     | 20.0     | 4.2             | 7.8      | 11.8     | 7                | 15       | 23       | 4.3             | 9.4      | 14.5  |
| X   |      | X     | 15                    | 6.0              | 12.5     | 20.0     | 3.8             | 8.0      | 11.5     | 7.0              | 14.0     | 23.0     | 5.0             | 9.5      | 14.2     | 8                | 16       | 26       | 5.2             | 11.5     | 17.5  |
| X   |      | X     | 20                    | 7.0              | 14.0     | 23.0     | 4.5             | 9.0      | 13.5     | 8.0              | 15.0     | 27.0     | 6.0             | 11.0     | 16.5     | 9                | 17       | 30       | 6.3             | 13.0     | 20.0  |
| X   |      | X     | 30                    | 8.0              | 16.0     | 27.0     | 5.5             | 11.5     | 16.5     | 9.0              | 18.0     | 30.0     | 7.2             | 13.5     | 20.0     | 10               | 20       | 34       | 7.5             | 16.0     | 25.0  |
| X   |      | X     | 40                    | 10.0             | 18.0     | 31.0     | 6.3             | 13.2     | 19.0     | 11.0             | 20.0     | 34.0     | 8.5             | 15.5     | 23.5     | 13               | 22       | 44       | 9.0             | 19.0     | 29.0  |
| X   |      | X     | 50                    | 11.0             | 20.0     | 34.0     | 7.0             | 14.7     | 21.5     | 13.0             | 23.0     | 40.0     | 9.5             | 17.3     | 26.0     | 15               | 26       | 58       | 10.0            | 21.0     | 35.0  |
| X   |      | X     | 75                    | 13.0             | 24.0     | 42.0     | 8.5             | 18.0     | 26.0     | 15.0             | 32.0     | 49.0     | 11.5            | 21.0     | 36.0     | 17               | 40       | 80       | 12.0            | 25.0     | 55.0  |
| X   |      | X     | 100                   | 16.0             | 32.0     | 50.0     | 9.8             | 21.0     | 30.0     | 18.0             | 40.0     | 60.0     | 13.2            | 24.5     | 48.0     | 20               | 48       | 92       | 13.5            | 30.0     | 65.0  |
| X   |      | X     | 150                   | 20.0             | 44.0     | 66.0     | 12.0            | 25.5     | 40.0     | 22.0             | 54.0     | 77.0     | 16.2            | 30.0     | 62.0     | 25               | 66       | 118      | 16.5            | 44.0     | 83.0  |
| X   | X    | X     | 200                   | 25.0             | 55.0     | 80.0     | 14.0            | 29.5     | 53.0     | 27.0             | 70.0     | 93.0     | 19.0            | 40.0     | 80.0     | 30               | 82       | 144      | 19.5            | 56.0     | 102.0 |
| X   | X    |       | 300                   | 34.0             | 70.0     | 80.0     | 17.0            | 36.0     | 80.0     | 39.0             | 95.0     | 110.0    | 23.0            | 53.0     | 100.0    | 43               | 110      | 200      | 24.0            | 80.0     | 130.0 |
| X   | X    |       | 400                   | 42.0             | 80.0     | 80.0     | 22.0            | 48.0     | 80.0     | 50.0             | 120.0    | 120.0    | 26.0            | 66.0     | 120.0    | 61               | 130      | 200      | 34.0            | 100.0    | 156.0 |
|   | X    |       | 600                   | 65.0             | 80.0     | 80.0     | 44.0            | 80.0     | 80.0     | 80.0             | 120.0    | 120.0    | 50.0            | 80.0     | 120.0    | 108              | 162      | 200      | 64.0            | 136.0    | 200.0 |

† Set Pressures are based upon valve discharge into an atmospheric pressure return line. If return line pressure is significantly higher than atmospheric pressure, then consult factory for capacity information.

\* For set pressures less than 10 psi consult the factory.



# FR Series - Back Pressure Valves

## Capacity Information (Continued)

| Type FR, FR-6, FR-10 Air Capacity (SCFM) |   |   |                       |                  |          |          |                 |          |          |                  |          |          |                 |          |          |                  |          |          |                 |          |     |
|--|---|---|-----------------------|------------------|----------|----------|-----------------|----------|----------|------------------|----------|----------|-----------------|----------|----------|------------------|----------|----------|-----------------|----------|-----|
| Types<br>FR<br>FR-6<br>FR-10             |   |   | Set Pressure (psig) † | Inlet Sizes      |          |          |                 |          |          |                  |          |          |                 |          |          |                  |          |          |                 |          |     |
|  |   |   |                       | 1/2"             |          |          |                 |          |          | 3/4"             |          |          |                 |          |          | 1"               |          |          |                 |          |     |
|  |   |   |                       | Rubber Diaphragm |          |          | Metal Diaphragm |          |          | Rubber Diaphragm |          |          | Metal Diaphragm |          |          | Rubber Diaphragm |          |          | Metal Diaphragm |          |     |
|  |   |   | 10% Rise              | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise | 10% Rise | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise | 10% Rise | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise |     |
| X  | X | X | 10*                   | 7                | 15       | 22       | 3               | 7        | 10       | 10               | 24       | 30       | 6               | 12       | 19       | 15               | 32       | 45       | 9               | 18       | 29  |
| X  | X | X | 15                    | 8                | 17       | 30       | 4               | 9        | 14       | 15               | 30       | 48       | 8               | 15       | 24       | 30               | 50       | 72       | 12              | 23       | 38  |
| X  | X | X | 20                    | 10               | 19       | 38       | 5               | 10       | 16       | 20               | 38       | 62       | 10              | 18       | 32       | 40               | 65       | 94       | 14              | 27       | 46  |
| X  | X | X | 30                    | 13               | 24       | 48       | 7               | 13       | 20       | 25               | 48       | 80       | 12              | 22       | 42       | 50               | 85       | 120      | 17              | 34       | 58  |
| X  | X | X | 40                    | 16               | 34       | 56       | 8               | 17       | 25       | 31               | 62       | 120      | 15              | 25       | 50       | 60               | 98       | 480      | 20              | 38       | 68  |
| X  | X | X | 50                    | 19               | 44       | 72       | 10              | 19       | 34       | 38               | 74       | 150      | 20              | 30       | 58       | 72               | 110      | 230      | 27              | 45       | 80  |
| X  | X | X | 75                    | 30               | 56       | 90       | 11              | 23       | 44       | 48               | 86       | 225      | 25              | 36       | 63       | 90               | 124      | 340      | 35              | 54       | 95  |
| X  | X | X | 100                   | 40               | 74       | 108      | 12              | 32       | 60       | 60               | 96       | 300      | 32              | 50       | 80       | 112              | 140      | 450      | 42              | 75       | 120 |
| X  | X | X | 150                   | 60               | 104      | 150      | 14              | 46       | 84       | 86               | 144      | 440      | 40              | 72       | 120      | 140              | 210      | 680      | 50              | 108      | 180 |
| X  | X | X | 200                   | 92               | 140      | 200      | 16              | 60       | 120      | 128              | 180      | 600      | 46              | 100      | 160      | 168              | 280      | 900      | 56              | 150      | 240 |
| X  | X | X | 300                   | 140              | 210      | 300      | 22              | 90       | 160      | 190              | 270      | 850      | 54              | 145      | 240      | 240              | 420      | 1250     | 66              | 215      | 360 |
| X  | X | X | 400                   | 180              | 280      | 400      | 35              | 120      | 240      | 240              | 360      | 1200     | 65              | 200      | 320      | 320              | 560      | 1800     | 77              | 300      | 480 |
| X  | X | X | 600                   | 280              | 420      | 600      | 50              | 180      | 320      | 380              | 540      | 1700     | 80              | 290      | 480      | 480              | 820      | 2500     | 98              | 430      | 720 |

| Type FR, FR-6, FR-10 AIR Capacity (SCFM) |   |   |                       |                  |          |          |                 |          |          |                  |          |          |                 |          |          |                  |          |          |                 |          |      |
|--|---|---|-----------------------|------------------|----------|----------|-----------------|----------|----------|------------------|----------|----------|-----------------|----------|----------|------------------|----------|----------|-----------------|----------|------|
| Types<br>FR<br>FR-6<br>FR-10             |   |   | Set Pressure (psig) † | Inlet Sizes      |          |          |                 |          |          |                  |          |          |                 |          |          |                  |          |          |                 |          |      |
|  |   |   |                       | 1 1/4"           |          |          |                 |          |          | 1 1/2"           |          |          |                 |          |          | 2"               |          |          |                 |          |      |
|  |   |   |                       | Rubber Diaphragm |          |          | Metal Diaphragm |          |          | Rubber Diaphragm |          |          | Metal Diaphragm |          |          | Rubber Diaphragm |          |          | Metal Diaphragm |          |      |
|  |   |   | 10% Rise              | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise | 10% Rise | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise | 10% Rise | 20% Rise         | 30% Rise | 10% Rise | 20% Rise        | 30% Rise |      |
| X  | X | X | 10*                   | 22               | 40       | 60       | 11              | 22       | 35       | 40               | 74       | 75       | 20              | 30       | 55       | 64               | 112      | 144      | 32              | 48       | 80   |
| X  | X | X | 15                    | 38               | 60       | 90       | 15              | 29       | 56       | 55               | 98       | 120      | 25              | 42       | 68       | 88               | 144      | 208      | 40              | 64       | 104  |
| X  | X | X | 20                    | 48               | 80       | 134      | 22              | 35       | 76       | 72               | 124      | 192      | 32              | 58       | 100      | 112              | 184      | 296      | 48              | 88       | 150  |
| X  | X | X | 30                    | 60               | 128      | 172      | 28              | 45       | 90       | 92               | 158      | 250      | 38              | 68       | 120      | 136              | 224      | 384      | 55              | 104      | 172  |
| X  | X | X | 40                    | 72               | 148      | 190      | 32              | 60       | 96       | 112              | 175      | 280      | 42              | 85       | 140      | 152              | 248      | 424      | 62              | 120      | 200  |
| X  | X | X | 50                    | 82               | 166      | 250      | 36              | 66       | 102      | 134              | 200      | 320      | 47              | 95       | 150      | 170              | 280      | 488      | 70              | 144      | 215  |
| X  | X | X | 75                    | 106              | 185      | 375      | 42              | 78       | 120      | 155              | 225      | 450      | 55              | 115      | 165      | 190              | 312      | 650      | 82              | 168      | 240  |
| X  | X | X | 100                   | 130              | 225      | 500      | 50              | 96       | 180      | 180              | 280      | 640      | 64              | 135      | 240      | 240              | 410      | 850      | 92              | 200      | 320  |
| X  | X | X | 150                   | 160              | 275      | 750      | 58              | 120      | 240      | 210              | 380      | 900      | 80              | 180      | 320      | 300              | 550      | 1100     | 120             | 272      | 475  |
| X  | X | X | 200                   | 200              | 350      | 1000     | 64              | 160      | 360      | 260              | 500      | 1250     | 100             | 250      | 480      | 400              | 750      | 1700     | 152             | 352      | 640  |
| X  | X | X | 300                   | 300              | 500      | 1450     | 82              | 250      | 480      | 400              | 700      | 1750     | 150             | 320      | 640      | 624              | 1050     | 2100     | 220             | 480      | 950  |
| X  | X | X | 400                   | 400              | 700      | 1950     | 120             | 350      | 700      | 520              | 1000     | 2400     | 200             | 500      | 950      | 800              | 1500     | 3150     | 300             | 700      | 1250 |
| X  | X | X | 600                   | 600              | 1000     | 2850     | 160             | 500      | 950      | 800              | 1400     | 3450     | 300             | 650      | 1250     | 1200             | 2100     | 4000     | 400             | 960      | 1750 |

† Set Pressures are based upon valve discharge into an atmospheric pressure return line. If return line pressure is significantly higher than atmospheric pressure, then consult factory for capacity information.

\* For set pressures less than 10 psi consult the factory.

CONTINUED ON FOLLOWING PAGE ►



## FR Series - Back Pressure Valves

### Capacity Information (Continued)

| Type FRM, FRM-C Water Capacity (GPM) |                  |          |                 |          |                  |          |                 |          |                  |          |                 |          |
|--------------------------------------|------------------|----------|-----------------|----------|------------------|----------|-----------------|----------|------------------|----------|-----------------|----------|
| Set Pressure (psi) †                 | Inlet Sizes      |          |                 |          |                  |          |                 |          |                  |          |                 |          |
|                                      | 1/8"             |          |                 |          | 1/4"             |          |                 |          | 3/8"             |          |                 |          |
|                                      | Rubber Diaphragm |          | Metal Diaphragm |          | Rubber Diaphragm |          | Metal Diaphragm |          | Rubber Diaphragm |          | Metal Diaphragm |          |
|                                      | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE |
| 10*                                  | 0.2              | 0.7      | 0.1             | 0.5      | 0.2              | 0.7      | 0.1             | 0.5      | 0.2              | 0.7      | 0.1             | 0.5      |
| 25                                   | 0.5              | 1.2      | 0.5             | 1.0      | 0.5              | 1.2      | 0.5             | 1.0      | 0.5              | 1.2      | 0.5             | 1.0      |
| 50                                   | 1.2              | 2.5      | 0.7             | 1.7      | 1.2              | 2.5      | 0.7             | 1.7      | 1.2              | 2.5      | 0.7             | 1.7      |
| 100                                  | 2.1              | 3.0      | 1.4             | 3.0      | 2.1              | 3.5      | 1.4             | 3.0      | 2.1              | 3.5      | 1.4             | 3.0      |
| 150                                  | 2.5              | 3.0      | 1.5             | 3.0      | 2.5              | 4.8      | 1.5             | 4.0      | 2.5              | 4.8      | 1.5             | 4.0      |

| Type FRM, FRM-C Air Capacity (SCFM) |                  |          |                 |          |                  |          |                 |          |                  |          |                 |          |
|-------------------------------------|------------------|----------|-----------------|----------|------------------|----------|-----------------|----------|------------------|----------|-----------------|----------|
| Set Pressure (psi) †                | Inlet Sizes      |          |                 |          |                  |          |                 |          |                  |          |                 |          |
|                                     | 1/8"             |          |                 |          | 1/4"             |          |                 |          | 3/8"             |          |                 |          |
|                                     | Rubber Diaphragm |          | Metal Diaphragm |          | Rubber Diaphragm |          | Metal Diaphragm |          | Rubber Diaphragm |          | Metal Diaphragm |          |
|                                     | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE |
| 10*                                 | 0.5              | 1.5      | 0.3             | 0.9      | 0.5              | 1.5      | 0.3             | 0.9      | 0.5              | 1.5      | 0.3             | 0.9      |
| 25                                  | 2.1              | 6.5      | 1.2             | 4.0      | 2.1              | 6.5      | 1.2             | 4.0      | 2.1              | 6.5      | 1.2             | 4.0      |
| 50                                  | 5.0              | 16.0     | 2.6             | 9.5      | 5.0              | 16.0     | 2.6             | 9.5      | 5.0              | 16.0     | 2.6             | 9.5      |
| 100                                 | 12.0             | 25.0     | 6.5             | 15.0     | 12.0             | 25.0     | 6.5             | 15.0     | 12.0             | 25.0     | 6.5             | 15.0     |
| 150                                 | 16.0             | 35.0     | 11.5            | 25.0     | 16.0             | 35.0     | 11.5            | 25.0     | 16.0             | 35.0     | 11.5            | 25.0     |

| Type FRM-2 Water Capacity (GPM) |                  |          |                 |          |                  |          |                 |          |                  |          |                 |          |
|---------------------------------|------------------|----------|-----------------|----------|------------------|----------|-----------------|----------|------------------|----------|-----------------|----------|
| Set Pressure (psi) †            | Inlet Sizes      |          |                 |          |                  |          |                 |          |                  |          |                 |          |
|                                 | 1/4"             |          |                 |          | 3/8"             |          |                 |          | 1/2"             |          |                 |          |
|                                 | Rubber Diaphragm |          | Metal Diaphragm |          | Rubber Diaphragm |          | Metal Diaphragm |          | Rubber Diaphragm |          | Metal Diaphragm |          |
|                                 | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE |
| 10*                             | 0.5              | 1.0      | 0.3             | 0.7      | 0.5              | 1.0      | 0.3             | 0.7      | 0.5              | 1.0      | 0.3             | 0.7      |
| 25                              | 0.7              | 1.7      | 0.7             | 1.2      | 0.7              | 1.7      | 0.7             | 1.2      | 0.7              | 1.7      | 0.7             | 1.2      |
| 50                              | 1.5              | 3.5      | 1.0             | 2.0      | 1.5              | 3.5      | 1.0             | 2.0      | 1.5              | 3.5      | 1.0             | 2.0      |
| 100                             | 2.7              | 5.0      | 2.0             | 4.0      | 2.7              | 5.0      | 2.0             | 4.0      | 2.7              | 5.0      | 2.0             | 4.0      |
| 150                             | 3.7              | 7.5      | 2.5             | 5.5      | 3.7              | 7.5      | 2.5             | 5.5      | 3.7              | 7.5      | 2.5             | 5.5      |
| 200                             | 4.5              | 8.5      | 3.0             | 6.5      | 4.5              | 8.5      | 3.0             | 6.5      | 4.5              | 8.5      | 3.0             | 6.5      |
| 250                             | 5.5              | 10.0     | 4.0             | 8.0      | 5.5              | 10.0     | 4.0             | 8.0      | 5.5              | 10.0     | 4.0             | 8.0      |

| Type FRM-2 Air Capacity (SCFM) |                  |          |                 |          |                  |          |                 |          |                  |          |                 |          |
|--------------------------------|------------------|----------|-----------------|----------|------------------|----------|-----------------|----------|------------------|----------|-----------------|----------|
| Set Pressure (psi) †           | Inlet Sizes      |          |                 |          |                  |          |                 |          |                  |          |                 |          |
|                                | 1/4"             |          |                 |          | 3/8"             |          |                 |          | 1/2"             |          |                 |          |
|                                | Rubber Diaphragm |          | Metal Diaphragm |          | Rubber Diaphragm |          | Metal Diaphragm |          | Rubber Diaphragm |          | Metal Diaphragm |          |
|                                | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE | 10% RISE         | 20% RISE | 10% RISE        | 20% RISE |
| 10*                            | 5.0              | 11.0     | 3.0             | 8.0      | 5.0              | 11.0     | 3.0             | 8.0      | 5.0              | 11.0     | 3.0             | 8.0      |
| 25                             | 9.0              | 14.0     | 5.0             | 11.0     | 9.0              | 14.0     | 5.0             | 11.0     | 9.0              | 14.0     | 5.0             | 11.0     |
| 50                             | 12.0             | 22.0     | 7.0             | 17.0     | 12.0             | 22.0     | 7.0             | 17.0     | 12.0             | 22.0     | 7.0             | 17.0     |
| 100                            | 16.0             | 33.0     | 11.0            | 25.0     | 16.0             | 33.0     | 11.0            | 25.0     | 16.0             | 33.0     | 11.0            | 25.0     |
| 150                            | 20.0             | 42.0     | 14.0            | 31.0     | 20.0             | 42.0     | 14.0            | 31.0     | 20.0             | 42.0     | 14.0            | 31.0     |
| 200                            | 24.0             | 52.0     | 17.0            | 38.0     | 24.0             | 52.0     | 17.0            | 38.0     | 24.0             | 52.0     | 17.0            | 38.0     |
| 250                            | 26.0             | 60.0     | 20.0            | 43.0     | 26.0             | 60.0     | 20.0            | 43.0     | 26.0             | 60.0     | 20.0            | 43.0     |

† Set Pressures are based upon valve discharge into an atmospheric pressure return line. If return line pressure is significantly higher than atmospheric pressure, then consult factory for capacity information.

\* For set pressures less than 10 psi consult the factory.

# FR Series - Back Pressure Valves

## Applications

The chart shows maximum temperature limits for various bodies and component part materials which are standardly available. Marked squares show how valve will be internally trimmed when temperature requirements so dictate. Many combinations for specific service are obviously possible. When in doubt, consult the factory.

| Maximum Temperature °F. | Selection Information |        |       |            |           |            |            |                  |            |           |        |            |        |        |         |               |         |
|-------------------------|-----------------------|--------|-------|------------|-----------|------------|------------|------------------|------------|-----------|--------|------------|--------|--------|---------|---------------|---------|
|                         | Body Material         |        |       |            | Body Seat |            |            | Seat Ring & Disc |            | Diaphragm |        |            |        | O-ring |         | Diaph. Gasket |         |
|                         | Iron                  | Bronze | Steel | 316 S. St. | Brass     | 303 S. St. | 316 S. St. | 303 S. St.       | 316 S. St. | BUNA-N    | Bronze | 316 S. St. | Monel® | BUNA-N | Teflon® | Hi Temp.      | Teflon® |
| 200                     | X                     |        |       |            | X         |            |            | X                |            | X         |        |            |        | X      |         |               |         |
| 450                     | X                     |        |       |            | X         |            |            | X                |            |           | X      |            |        |        | X       | X             |         |
| 450                     | X                     |        |       |            |           | X          |            | X                |            |           |        | X          |        |        | X       | X             |         |
| 450                     | X                     |        |       |            | X         | X          |            | X                |            |           |        | X          |        |        | X       | X             |         |
| 200                     |                       | X      |       |            | X         |            |            | X                |            | X         |        |            |        | X      |         |               |         |
| 450                     |                       | X      |       |            |           |            |            | X                |            |           | X      |            |        |        | X       | X             |         |
| 450                     |                       | X      |       |            | X         | X          |            | X                |            |           |        | X          |        |        | X       | X             |         |
| -320                    |                       | X      |       |            |           | X          |            | X                |            |           | X      |            |        |        | X       |               | X       |
| 600                     |                       |        | X     |            |           | X          |            | X                |            |           |        |            | X      | *      | *       | X             |         |
| 200                     |                       |        |       | X          |           |            | X          |                  | X          | X         |        |            |        | X      |         |               |         |
| 600                     |                       |        |       | X          |           |            | X          |                  | X          |           |        |            | X      | *      | *       | X             |         |
| 200                     |                       |        |       | X          |           | X          |            | X                |            | X         |        |            |        | X      |         |               |         |
| 600                     |                       |        |       | X          |           | X          |            | X                |            |           | X      |            |        | *      | *       | X             |         |

\* Special gasket furnished in lieu of O-ring for 600°F.

## How To Order

To order, specify Cash Valve type by specific series designation (i.e. Type FR or FR-6) and the valve body style (i.e. 2-way or 3-way, etc.), if applicable. Also state the following:

1. Valve size
2. Service (water, air, oil, etc.)
3. Inlet pressure range and set point
4. Outlet pressure (if any)
5. Maximum required flow rate
6. System operating temperature
7. Optional features, if any, as described for a specific valve.

Cash Valve  
 953 Old U.S. Highway 70  
 Black Mountain, NC 28771  
 Phone: 800-879-2042 • 828-669-3700  
 Fax: 800-879-2057 • 828-669-0586

[www.cashvalve.com](http://www.cashvalve.com)

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